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Effective Scheduling of Jobs Using Reallocation of Resources Along With Best Fit Strategy and Priority

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Abstract – Grid computing let the devices to distribute the job across different environment, where the resources are heterogeneous in nature. It is a collection of resources from different states in order to attain common goal. Scheduling of jobs is one of the major crises that play a vital role nowadays. So, this paper proposes a scheduling algorithm where the resources can be effectively allocated. Grid Scheduler plays a vital role in allocating the jobs to the resources. Before the job arrives, the function of the Grid Scheduler is to reassemble the memory by its size. When the job arrives, the Shortest Job First algorithm along with the best fit strategy is applied to allocate the job effectively to the resources in order to reduce the wastage of memory. If same sized jobs arrive at the scheduler priority rule is applied to allocate the job. If the job size is not as same as the resource size, at that case the Grid Scheduler locates the resources that are nearby equal to the job size and allocate the resources for that job. The free space that is remaining in those resources is likewise combined with all the free spaces that are remaining in all of the resources, so that these spaces can be combined and used as resource for some other job allocation. The memory wastage is managed at this situation. Here Grid Resource Broker is used for combining all the free memory space. Through this approach scheduling can be performed effectively.

Key Terms – Grid Computing, Grid Scheduler (GS), Shortest Job First (SJF), Best Fit (BF), Priority, Grid Resource Broker (GRB).

I. INTRODUCTION

Grid computing let devices connected over the internet to share the geographically distributed resources. Resources may be of heterogeneous type, accessing those types of resources plays a vital role in grid computing. Scheduling of such resources is a complicated tasks remaining today. This paper proposes a novel scheduling strategy that is used for scheduling the resources in an effective manner. Grid Scheduler plays a major role in scheduling. The function of Grid Scheduler is to allocate the jobs to particular resources. Before the job arrives the function of the Grid Scheduler is to reallocate the memory based on their size. After the arrival of the job, shortest job first along with the best fit strategy is applied to allocate the job in an efficient manner in order to reduce the memory wastage. There are two strategies to be considered while using the best fit strategy:

1. If same size jobs arrive, the function of the Grid Scheduler is to use priority rule so that the job which arrives first is provided the first priority.
2. If suitable resource is not available for the job, the Grid Scheduler locates the resources that are nearby equal to the job size and allocate the resource for that job.
3. The free space that is remaining in that resource is likewise combined with the free space that is remaining in other resources.

Through this strategy the wastage of memory space is reduced because the free space

is used for other jobs. The Grid Resource Broker is responsible for locating the free memory space and intimating it to the Grid Scheduler, so that the Grid Scheduler can allocate the jobs to particular resources. At this situation the scheduling can be performed effectively without the wastage of resources. This paper is organized into different sections. Section II describes the proposed method, Section III describes the simulation results, Section IV describes the conclusion of this paper.

reallocation is performed means, resources may be of different size in order to use the resources in an effective manner only we are performing resource reallocation. After the Grid Scheduler reallocates the resources, when the job arrives at the scheduler the Best Fit strategy is applied to allocate the job to the resources based on the job size. Why this best fit strategy is used, means to reduce the free memory space available in all of the resources. Another one case occurs while using this approach, if same sized jobs arrive at the scheduler, at that time priority rule is applied to [illegible]e job. The second case is, if suitable re[illegible]ot available for the job, the resource

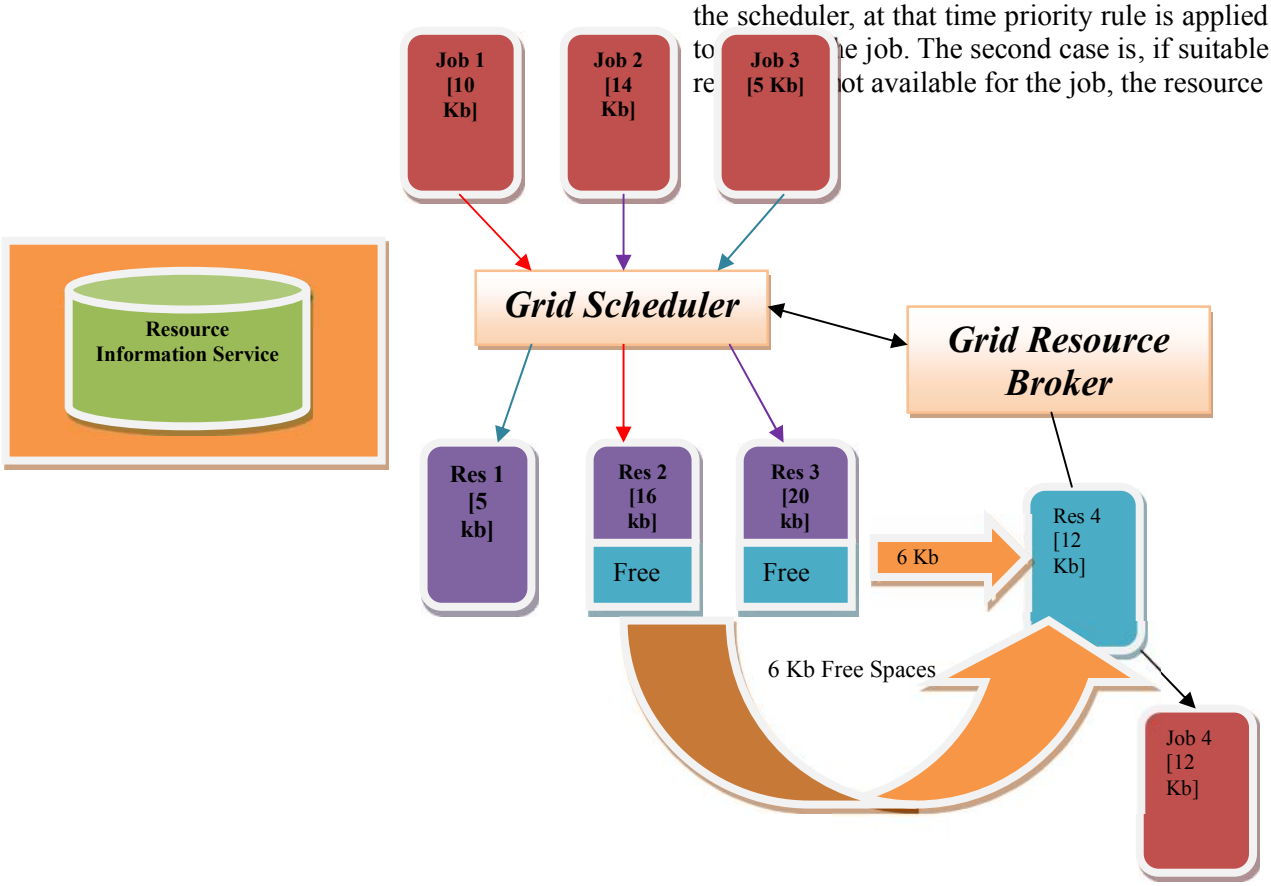

Fig 1: Grid Component Diagram for Scheduling.

II. PROPOSED METHOD

Here in this paper we have proposed several algorithmic strategies which are used for making the scheduling effectively. The resources may be available at different location, accessing those types of resources is a tedious process. First of all, the function of the Grid Scheduler is to locate the resources that are available as free. Then the resources must be reallocated, why this

that is nearby equal to the job size is allocated. The free space that is available in that resource is used for allocating another job. Through this approach the wastage of memory space is reduced. Here Grid Resource Broker plays a vital role. The function of the Grid Resource Broker is to locate the free memory spaces in the resources, collects all the free spaces available in the resources and provides it to the Grid

Scheduler so that the Grid Scheduler allocates the resources to particular jobs. The wastage of resource space is reduced as well as the time required for allocating the job to particular resource is reduced.

ALGORITHM:

Step 1: Check for the availability of free resources.
Step 2: Grid Scheduler reallocates all the resources based on their size.
Step 3: When job arrives Grid Scheduler uses Shortest Job First along with the Best Fit strategy for allocating the jobs.
Step 4: If same size job arrives priority is used for allocating the job.
Step 5: If the job size is not as much equal to that of the resource size, at that time the resource which is nearby equal to the job size is allocated.
Step 6: The free space that is remaining in the resource is collected by the Grid Resource Broker.
Step 7: The GRB allocates the free resource space to some other job that is waiting for the resource.
Step 8: The memory wastage as well as waiting space is reduced at this situation.

1. $\lambda = 1...n$ (λ – Number of Resources)
2. for (j=1;j<=n; j++)
3. λ_j, sort λ_j based on their size
4. for (j=1;j<=n; j++)
5. Get μ_j; (μ - Number of Jobs)
6. If (μ_j [size] == λ_j [size])
7. $\lambda_j = \mu_j$;
8. else if (μ_j [size] < AvailRes[size])
9. {
10. Allocate the job to the resources whose size is nearby equal;
11. }
12. AvailRes[size] = μ_j [size];
13. else if (μ_j [size] = = μ_{j+1}[size])
14. {
15. Apply priority;
16. }
17. else if (μ_j [size] > AvailRes[size])
18. {
19. Combine free space remaining from previously allocated resource & use it;
20. }
21. else
22. {
23. Allow the job to wait for resources till it becomes free;
24. idle(μ_j);
25. }
26. End if;
27. End if;
28. End if;
29. End.

III. SIMULATION RESULTS

The simulation results show that our proposed algorithm works well. Graphs were plotted for different approaches. The below graph describes about the number of resources available along with its size.

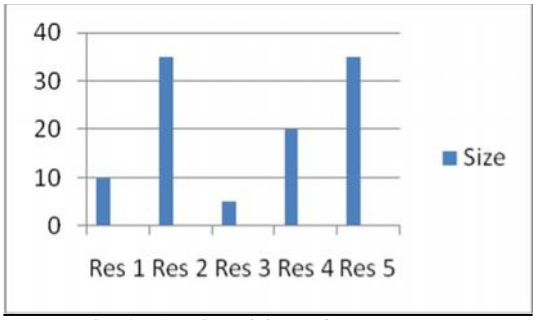

Fig 1: Availability of Resources

For the reallocation of jobs the Gris Scheduler plays a major role. For what reallocation is performed, in order to reduce the time of search of the resources and to effectively allocate the jobs size wise.
After the reallocation of the resources, the Best Fit strategy is applied to allocate the job effectively to the suitable resources.

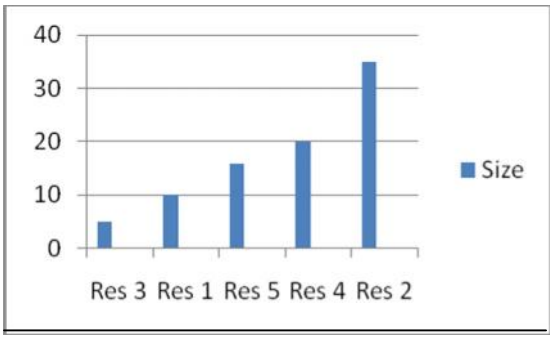

Fig 2: Reallocation of resources based on their size.

The below graph clearly depicts about the resources and jobs which are available. The jobs are allocated efficiently to suitable resources using Best Fit Strategic approach. In this case the wastage of resource space is considered as well.

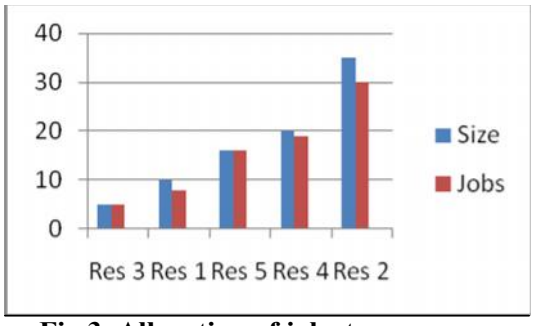

Fig 3: Allocation of jobs to resources Using Best Fit Strategy

The next case is if same size jobs arrive at the scheduler, the priority rule is applied.

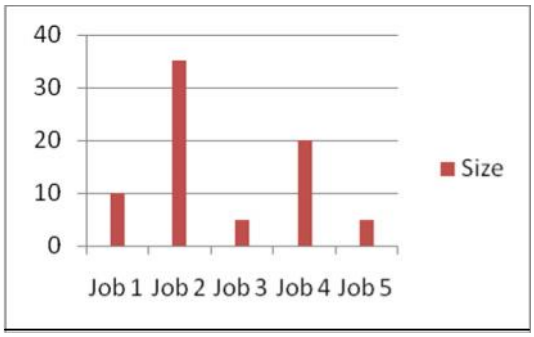

Fig 4: Jobs based on their size

The Grid Resource Broker points this free resource and allocates the jobs on that resource that is equal to its size. Through this strategy the waiting time for the resources is reduced.

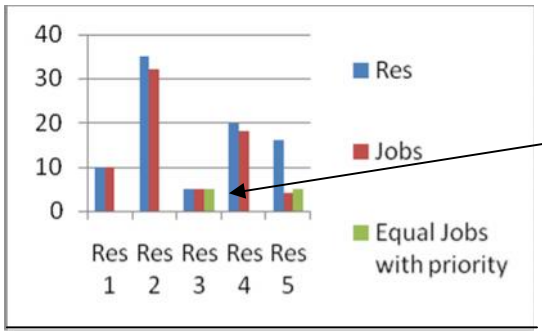

Fig 5: Applying priority rule to equal size jobs.

For example if job 3 and job 5 are of same size, job 5 arrives first compared to job 3, so job 5 is given first priority and it is allocated. If suitable resources are not available for a particular job, the resource which is nearby equal to the job size is selected and allocated for the particular job.

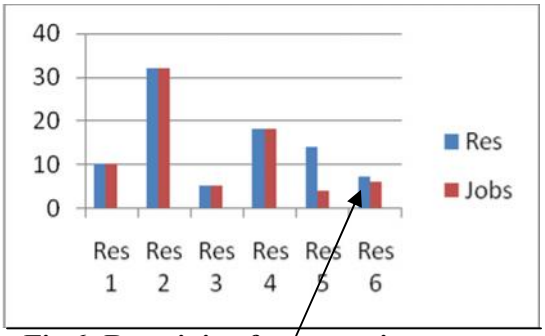

Fig 6: Remaining free space in resource Is used for another job.

Res 6 specify the free space combined from other resource and used for allocating other job.

Next case is the waste space that is remaining in the resources is combined and it is used as resource for allocating to another job that is waiting for the resource. The free resource spaces are combined with the help of the Grid Resource Broker.

IV. CONCLUSION

This paper has discussed about the scheduling of jobs in an efficient way. Our

simulation results show that this approach works well in scheduling the jobs. By using this approach the jobs can be scheduled based on the size of the resources that are available. To avoid the confusion of the arrival of same size jobs, here we have used the priority rule so that the jobs can be effectively synthesized. The waiting time of process for the resources is reduced at this case, because the free space that is remaining in the resources is combined together and is allocated for other jobs that are waiting for the resource. Through this we have reduce the waiting time of the job. This approach can be extended for some other strategically purpose.

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